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1104.01 General

Washington State Department of Transportation practical design policy requires formulating and evaluating alternatives while considering acceptable performance trade-offs to meet the need(s) of a project at the lowest level of investment. This chapter discusses how:

- Information determined from planning phases and Chapters 1101, 1102, and 1103 is utilized in alternative solution formation
- To evaluate the alternative solutions developed

This chapter presents methods for developing alternatives. For projects requiring an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), a final proposed alternative may only be determined through the National Environmental Policy Act (NEPA) process and/or the State Environmental Policy Act (SEPA) process (see Chapter 400 of the Environmental Manual for more information). If an EA or EIS has not been initiated under NEPA/SEPA, follow the procedures in this chapter. To help advance the project, consider and use appropriate NEPA/SEPA terminology. Perform public and agency outreach and document all information regarding alternatives development for use later in the NEPA/SEPA process, according to 23 CFR 168(d). Terminology used in this chapter assumes that NEPA/SEPA have not been initiated. In the event that the NEPA/SEPA process has been initiated and an EA or EIS will be required, coordinate with the region Environmental Office staff to make sure that this alternative formulation and evaluation is performed in accordance with NEPA/SEPA guidance.

1104.02 Alternative Solution Formulation

An important function of alternative solution formulation is to identify alternatives that address the baseline need while balancing the performance trade-offs identified in the process. This can include analysis of multimodal trade-offs and the formulation of multimodal/intermodal solutions. Need identification and contributing factor analysis (CFA) are critical to alternative solution formulation (see [Chapter 1101](#) and guidance document [Contributing Factors Analysis](#) for more information). Conduct alternative solutions formulation according to the following principles:

- Formulate alternatives compatible with context and design controls
- Form solutions around contributing factors or the underlying root reason(s) identified from CFA. Address the underlying root reason(s) determined from CFA in at least one alternative.
- Evaluate the relative benefit between each alternative against the baseline and contextual performance metrics to determine the optimally performing solution for the least cost. (See 1104.03(3) for information on calculating the benefit/cost of alternatives.)

Planning phase corridor sketches or studies may identify WSDOT's strategy for the corridor (see the guidance document section titled [Alternative Strategies and Solutions](#) for more information regarding different strategies that may be considered). If this has occurred, develop at least one alternative based on that identified strategy and bring forward into the alternative evaluation process (see 1104.03).

In some cases, planning studies may have developed specific alternatives. Carry planning phase alternatives into the alternative evaluation process, unless planning phase alternatives are obsolete. In some cases, alternatives may present opportunities for phased implementation.

1104.03 Alternative Solution Evaluation

Alternative solution evaluation involves understanding the performance benefits obtained from alternative solutions in relation to the selected design year and cost. It is the intent of the alternative solution evaluation process to:

- Compare solutions that resolve the baseline need(s) in consideration with the benefits or impacts associated with the contextual needs.
- Analyze the relative value of each alternative, including associated performance trade-offs.
- Mitigate unacceptable performance trade-offs with proven countermeasures.
- Refine targets if mitigation measures applied yield unacceptable performance trade-offs.

1104.03(1) Alternatives Comparison

WSDOT's alternatives comparison process is intended to align with performance-based decision-making. The process is complementary to a practical design approach. The process centers around achieving the basic performance need, while understanding and when necessary mitigating for the potential effects to other performance areas.

Use the [Alternative Comparison Table \(ACT\)](#) to assist in evaluating alternatives and identified baseline and contextual performance. The intent of comparing alternatives is to:

- Obtain an alternative solution for the least cost while understanding associated performance trade-offs.
- Compare alternatives against their ability to accomplish the baseline need.
- Evaluate alternatives against their relative effects on contextual needs.
- Provide the opportunity to incorporate mitigation or countermeasures.
- Document alternative formulation and evaluation outcomes that are consistent with the environmental process and expectations.

Note that if there are a large number of contextual needs under consideration, it may be beneficial to prioritize or use a weighted evaluation of the contextual needs in order to expedite the alternative evaluation.

As discussed in 1104.02, at least one alternative based on the outcome of Contributing Factors Analysis should be compared against other alternatives.

The Alternative Comparison Table template and examples can be found at:

www.wsdot.wa.gov/Design/Support.htm

1104.03(2) Performance Trade-off Decisions

In performance trade-off decisions, the intent is to give priority to the project's baseline needs. However, there will be situations where evaluations reveal that trade-offs are too significant, and there is an inability to adequately resolve them with low-cost countermeasures, phased solutions, or general acceptance of the performance trade-off. In these situations, it is appropriate to consider alternatives that still optimize the baseline performance metric, but do not necessarily obtain initial performance targets. Document refined performance targets on the Basis of Design.

1104.03(3) Benefit/Cost Analysis

Inherent with understanding the performance trade-offs being considered, is the overall benefit/cost for the alternatives proposed. In some cases, decisions will be based on life cycle cost for maintenance items, as discussed in [Chapter 301](#). In other cases, perceived benefits are a challenge to quantify and will need analysis such as that discussed in *NCHRP Report 642: Quantifying the Benefits of Context Sensitive Solutions*:

Quantifying the Benefits of Context Sensitive Solutions:

www.trb.org/Publications/Blurbs/162282.aspx

1104.04 Documentation

The [Alternative Comparison Table](#) (ACT) is used to assist in evaluating alternatives. Summarize the alternatives evaluated with the ACT in Section 4 of the Basis of Design (BOD). Alternative formulation and evaluation will also be documented through the NEPA process. Environmental staff will help account for consistency with the environmental process, expectations and requirements throughout any alternative formulation and evaluation that occurs within project development.

1104.05 References

1104.05(1) Federal/State Directives, Laws, and Codes

[42 United States Code \(USC\) 4321](#), National Environmental Policy Act of 1969 (NEPA)

[Chapter 43.21C Revised Code of Washington \(RCW\)](#), State Environmental Policy Act (SEPA)

[Chapter 468-12 Washington Administrative Code \(WAC\)](#), WSDOT SEPA Rules

[Secretary's Executive Order 1090](#) – Moving Washington Forward: Practical Solutions

[Secretary's Executive Order 1096](#) – WSDOT 2015-17: Agency Emphasis and Expectations

[Secretary's Executive Order 1028](#) – Context Sensitive Solutions

[Secretary's Executive Order 1018](#) – Environmental Policy Statement

1104.05(2) Guidance and Resources

[Environmental Manual](#), M 31-11, WSDOT

Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M 21-01, WSDOT

Understanding Flexibility in Transportation Design – Washington, WA-RD 638.1, Washington State Department of Transportation, 2005

🔗 www.wsdot.wa.gov/research/reports/fullreports/638.1.pdf

1104.05(3) Supporting Information

Designing Walkable Thoroughfares: A Context Sensitive Approach, Institute of Transportation Engineers, Washington D.C., 2010.

🔗 www.ite.org

NCHRP Report 642 – Guidelines for Quantifying the Benefits of Context Sensitive Solutions, Transportation Research Board, Washington D.C., 2014

🔗 <http://www.trb.org/Publications/Blurbs/162282.aspx>

NCHRP Synthesis 443 – Practical Highway Design Solutions, Transportation Research Board, Washington D.C., 2013

🔗 <http://www.trb.org/Main/Blurbs/168619.aspx>